Background:

Osteosynthesis is the process by which the facial bone discontinuity caused due to fracture are stabilized thereby ensuring an early recovery of the function. Rigid bone fixation using miniplates is the most advanced and a successful approach adopted in the field of oral and maxillofacial surgery. The most commonly used miniplates for rigid bone fixation are stainless steel and titanium miniplates. Both the type of miniplates have got different mechanical properties and advantages and disadvantages over the other. Sterilization is the final process before placing the miniplates in the host. Repeated cycles of autoclave sterilization of the miniplates may affect the mechanical properties of the miniplates.

Aims and Objectives:

The aim of this study is to find out whether there are any significant differences in the mechanical properties between the titanium alloy and stainless steel after undergoing periodic repeated cycles of autoclaving and to estimate which metal has the ability to withstand the no of repeated cycles of sterilization without undergoing much changes in their mechanical characteristics.

Materials and methods:

This is a prospective study which consists of a total of 36 samples (18 stainless steel and 18 titanium miniplates). Comparative analysis of the

mechanical characteristics of titanium and stainless steel mini plates are done for 6 samples before autoclaving and 32 samples after repeated cycles of autoclaving. Autoclaving is done at intervals of 10, 20,30, 40 and 50 cycles. The miniplates are kept in sterilization pouch and autoclaved at 134^0C and 2.0 bar (30psi) of pressure for 20 minutes and is then sent to lab for destructive test assays. The results were obtained and were statistically analyzed.

Results:

The obtained results showed that there was difference in the properties among stainless steel and titanium miniplates following autoclaving. There were changes in the values among the groups which showed that the number of cycles of autoclaving had impact on the properties. The hardness test revealed that titanium was harder than stainless steel with increasing number of autoclaving cycles. Due to their lesser hardness and higher ductility the stainless steel had good tensile strength. Although there was mild variation in the values obtained for flexural strength among stainless steel and titanium miniplates, the mean value obtained revealed that stainless steel had better flexural strength than that of titanium after repeated cycles of autoclaving.

Conclusion:

The destructive analysis test showed that there were changes in the mechanical properties of the titanium and stainless steel before and after repeated cycles of autoclaving. Comparison between titanium and stainless steel revealed

that titanium was harder that stainless steel, while stainless steel had better flexural and tensile strength when compared to titanium before and after repeated cycles of autoclaving. Thus it is concluded that both stainless steel and titanium are used for their individual mechanical properties and that repeated cycles of autoclaving has got some effects on the mechanical properties of miniplates.

Keywords:

Autoclave Sterilization, Stainless Steel Miniplate, Titanium Miniplate, Hardness, Tensile Strength, Flexural Strength.